BUREAU OF WATER

South Carolina Department of Health and Environmental Control

SHELLFISH MANAGEMENT AREA 14

2006 ANNUAL UPDATE

Shellfish Sanitation Program

Water Monitoring, Assessment and Protection Division
Environmental Quality Control - Bureau of Water
2600 Bull Street
Columbia, South Carolina 29201

July 2006

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South Carolina Department of Health and Environmental Control

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2006 ANNUAL UPDATE

[Data Thru December 2005]

Shellfish Management Area 14
Shellfish Sanitation Program

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South Carolina Department of Health and Environmental Control

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ANNUAL UPDATE
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SCDHEC EQC Bureau of Water

Data Inclusive Dates:
01/01/03 thru 12/31/05

Classification Change:
X Yes ___No

Shoreline Survey Completed: Yes

(I)ncreased/(D)ecreased/(N)one:
D Approved
N Cond. Approved
I Restricted
N Prohibited

Prior Report & Date: Annual -2005

SUMMARY

The majority of sampling stations in Shellfish Management Area 14 exhibited a slight decline in water quality (slight increases in geometric mean and/or 90th percentile values) subsequent to the previous sanitary survey. The bacteriological water quality data also reflects the return to normal rainfall amounts in 2005 following the below normal conditions the region experienced during 2004.

Station 20, near Fenwick Cut between the South Edisto and Ashepoo River exceeds the statistical criteria for an Approved classification (estimated 90^{th} percentile value of 50 mpn). Based upon water quality data at Station 20, waters of Fenwick Cut, as well as the Ashepoo River between Station 20 and Station 08 (mouth of Ashepoo River and St. Helena Sound) will be classified as Restricted.

INTRODUCTION

PURPOSE AND SCOPE

The authority to regulate the harvest, sanitation, processing and handling of shellfish is granted to the South Carolina Department of Health and Environmental Control by Section 44-1-140 of the Code of Laws of South Carolina, 1976, as amended. The Department promulgated Regulation 61-47, which provides the rules used to implement this authority and outlines the requirements applied in regulating shellfish sanitation in the State This regulation specifically addresses classification of shellfish harvesting areas and requires that all areas be examined by sanitary and bacteriological surveys and classified into an appropriate shellfish harvesting classification.

The National Shellfish Sanitation Program (NSSP) Guide For The Control Of Molluscan Shellfish is used by the United States Food and Drug Administration (USFDA) to evaluate state shellfish sanitation programs. The NSSP Model Ordinance requires that a sanitary survey be in place for each growing area prior to its use as a source of shellfish for human consumption and prior to the area's classification as Approved, Conditionally Approved, Restricted, or

Conditionally Restricted. Each sanitary survey shall be updated on an annual basis and accurately reflect changes which have occurred within the area. Requirement of the annual reevaluation include, at a minimum, field observations of pollution sources, an analysis of water quality data consisting of the past year's data in combination with appropriate previously collected data, review of reports and effluent samples from pollution sources, and review of performance standards for discharges impacting the growing area. A brief report documenting the findings shall also be provided.

The following criteria consistent with the NSSP Model Ordinance and S. C. Regulation 61-47 are used in establishing shellfish harvesting classifications:

Approved - Growing areas shall be classified Approved when the sanitary survey concludes that fecal material, pathogenic microorganisms, and poisonous or deleterious substances are not present in concentrations which would render shellfish unsafe for human consumption. The Approved area classification shall be designated based upon a sanitary survey, which includes water samples collected from stations in the designated area adjacent to actual or potential sources of pollution. For waters sampled under adverse pollution conditions, the median fecal coliform Most Probable Number (MPN) or the geometric mean MPN shall not exceed fourteen per one hundred milliliters, and not more than ten percent of the samples shall exceed a fecal coliform MPN of forty-three per one hundred milliliters (per five tube decimal dilution). For waters sampled under a systematic random sampling plan, the geometric mean fecal coliform Most Probable Number (MPN) shall not exceed fourteen per one hundred milliliters, and the estimated ninetieth percentile shall not exceed an MPN of forty three (per five tube decimal dilution). Computation of the estimated ninetieth percentile shall be obtained using NSSP Guidelines.

Conditionally Approved - Growing areas may be classified Conditionally Approved when they are subject to temporary conditions of actual or potential pollution. When such events are predictable, as in the malfunction of wastewater treatment facilities, non-point source pollution from rainfall runoff, discharge of a major river, or potential discharges from dock or harbor facilities that may affect water quality, a management plan describing conditions under which harvesting will be allowed shall be adopted by the Department prior to classifying an area as Conditionally Approved. Where appropriate, the management plan for each Conditionally Approved area shall include performance standards for sources of controllable pollution, e.g., wastewater treatment and collection systems, evaluation of each source of pollution, and means of rapidly closing and subsequent reopening areas to shellfish harvesting. Memorandums of agreements shall be a part of these management plans where appropriate.

Restricted - Growing areas shall be classified Restricted when sanitary survey data show a limited degree of pollution or the presence of deleterious or poisonous substances to a degree which may cause the water quality to fluctuate unpredictably or at such a frequency that a Conditionally Approved classification is not feasible. Shellfish may be harvested from areas classified as Restricted only for the purposes of relaying or depuration and only by special permit issued by the Department and under Department supervision. For Restricted areas to be utilized as a source of shellstock for depuration, or as source water for depuration, the fecal coliform geometric mean MPN of restricted waters sampled under adverse pollution conditions shall not exceed eighty-eight per one hundred milliliters and not more than ten percent of the

samples shall exceed a MPN of two hundred and sixty per one hundred milliliters for a five tube decimal dilution test. For waters sampled under a systematic random sampling plan, the fecal coliform geometric mean MPN shall not exceed eighty-eight per one hundred milliliters and the estimated ninetieth percentile shall not exceed an MPN of two hundred and sixty (five tube decimal dilution). Computation of the estimated ninetieth percentile shall be obtained using NSSP guidelines.

Conditionally Restricted - Growing areas may be classified Conditionally Restricted when they are subject to temporary conditions of actual or potential pollution. When such events are predictable, as in the malfunction of wastewater treatment facilities, non-point source pollution from rainfall runoff, discharge of a major river, or potential discharges from dock or harbor facilities that may affect water quality, a management plan describing conditions under which harvesting will be allowed shall be prepared by the Department prior to classifying an area as Conditionally Restricted. Where appropriate, the management plans for each Conditionally Restricted area shall include performance standards for sources of controllable pollution (e.g., wastewater treatment and collection systems and an evaluation of each source of pollution) and description of the means of rapidly closing and subsequent reopening areas to shellfish harvesting. Memorandums of agreements shall be a part of these management plans where appropriate. Shellfish may be harvested from areas classified as Conditionally Restricted only for the purposes of relaying or depuration and only by permit issued by the Department and under Department supervision. For Conditionally Restricted areas to be utilized as a source of shellstock for depuration, the fecal coliform geometric mean MPN of Conditionally Restricted waters sampled under adverse pollution conditions shall not exceed eighty-eight per one hundred milliliters and not more than ten percent of the samples shall exceed a MPN of two hundred and sixty per one hundred milliliters for a five tube decimal dilution test. For waters sampled under a systematic random sampling plan, the fecal coliform geometric mean MPN shall not exceed eighty-eight per one hundred milliliters and the estimated ninetieth percentile shall not exceed an MPN of two hundred and sixty (five tube decimal dilution). Computation of the estimated ninetieth percentile shall be obtained using NSSP guidelines.

Prohibited - Growing areas are classified Prohibited if there is no current sanitary survey or if the sanitary survey or monitoring data show unsafe levels of fecal material, pathogenic microorganisms, or poisonous or deleterious substances in the growing area or indicate that such substances could potentially reach quantities which could render shellfish unfit or unsafe for human consumption.

BACKGROUND INFORMATION

Shellfish Growing Area 14 comprises approximately 47,921 acres of shellfish growing area habitat located in Beaufort and Colleton counties. It consists of portions of the Coosaw River and its tributaries including Huspah Creek, Whale Branch Creek, and the Bull, Combahee, and Ashepoo Rivers. The area west of the Combahee River is located in Beaufort County while areas to the east of the Combahee River are in Colleton county. The boundary of Area 14 was amended in the 1998 sanitary survey to include additional portions of Huspah Creek, with the subsequent boundary extending to S. C. Highway 17 and S. C. Highway 21.

The area's northern boundary includes S. C. Highway 17 at Huspah Creek and extends along an imaginary line crossing the lower portions of Bull River, Combahee River, and Rock Creek, to a point at the confluence of Mosquito Creek and the Ashepoo River. The eastern boundary begins at the confluence of the Ashepoo and Edisto Rivers at Fenwick Cut and ends at the point of Otter Island. The southern boundary line crosses St. Helena Sound to Morgan Island. The southern boundary then follows the shoreline of Coosaw River, and includes the areas that drain to Coosaw River, such as Morgan Back Creek and a portion of McCalley Creek. The Southern boundary adjoins the Area 17 boundary at Whale Branch Creek. The western boundary runs parallel to Huspah Creek ending at S. C. Highway 17.

The harvesting classifications of Area 14 prior to this survey were as follows:

Prohibited: (Administrative closure)

1. Campbell Creek, from its headwaters to its confluence with Whale Branch Creek;
2. Halfmoon Creek, from its headwaters to its confluence with Whale Branch Creek;

Restricted:

1. Huspah Creek, from the Shellfish Management Area 14 boundary at S. C. Highway 17 to Station 14, Huspah Creek at Railroad Trestle.
2. Whale Branch Creek, from station 14, Huspah Creek at Railroad Trestle to Station 02, Campbell Creek at Whale Branch.
3. Ashepoo River, from Station 21, at the confluence of Mosquito Creek, to Station 20, (Fenwick) Cut between the South Edisto River and the Ashepoo River.

Approved:

The remaining waters of Area 14

Station Addition: None

The shellfish industry in South Carolina is based on the harvest of the eastern oyster (*Crassostrea virginica*) and hard clams (*Mercenaria mercenaria*). Areas in South Carolina designated for commercial harvest by the South Carolina Department of Natural Resources (SCDNR) include State Shellfish Grounds, Culture Permits, and Kings Grant areas.

The general public is allowed to harvest on three State Shellfish Grounds (SSG), one Public Oyster Ground (POG), and two Culture Permits (C-120 and C-125) in Area 14. State shellfish ground 134 is located on Hutchinson Island, SSG-135 is in the Ashepoo River, and SSG-065 is located on Morgan Island. Recreational harvesting is allowed for clams and oysters in all three areas and commercial harvesting by licensed individuals for clams and oysters is allowed, subject to seasons determined by DNR. Recreational harvesting only is permitted on the Ashe Island POG. Culture Permits C-120 and C-125 are leased to Dusenbury Seafood.

Shellfish harvesting season in South Carolina extends from September 16 through May 15, although actual dates may vary. SCDNR has the authority to alter the shellfish-harvesting season for management purposes. The South Carolina Department of Health and Environmental Control has the authority to prohibit shellfish harvesting when necessary to ensure that all shellfish harvested in South Carolina waters are safe for human consumption.

POLLUTION SOURCE SURVEY

SURVEY PROCEDURES

Shoreline surveys of Area 14 were conducted by the Low Country District Shellfish Sanitation staff**,** by watercraft, vehicle, and on foot, during the survey period and are ongoing.

POINT SOURCE POLLUTION

Major sources of actual or potential pollution (see Figure 4).

PERMITTED SOURCES	PERMIT #/TYPE/ DISCHARGE
Nufarm Specialty Products, Inc. (formerly Lobeco Products Inc)	SC0000914- diffuser/Campbell Creek
Springs Ind/Wamchem NPL site	SC0046701/groundwater remed./McCalley Cr
James J. Davis Elementary School	SC0027481- discharge pipe/ditch

A. **Municipal and Community Waste Treatment Facilities** - James J. Davis Elementary School is permitted to discharge up to 8,000 gallons per day of treated wastewater to a ditch leading to Halfmoon Creek and Whale Branch Creek. The Whale Branch Elementary and Middle schools have been completed. This site is located adjacent to the S. C. Highway 21 Bridge on the southern shore of Whale Branch Creek. The schools are served by sewer.

B. **Industrial wastes** – Nufarm Specialty Products, Incorporated (formerly Lobeco Products Incorporated) is permitted (NPDES Permit SC0000914) to discharge through a diffuser into Campbell Creek.

A groundwater remediation system at the site of the former Springs Industries/Wamchem industrial site discharges into the headwaters of McCalley's Creek. There is no sewage and therefore no fecal coliform bacteria component of the discharge. The SCDHEC Division of Health Hazard Evaluation has reviewed the list of chemicals of concern for the Wamchem site and has concluded that McCalley Creek, the majority of which is in Area 15, could be opened to shellfish harvesting from Station 15-01, upstream to Station 15-33, which is approximately 1.3 miles downstream of the discharge site. Sampling at two existing stations in McCalley Creek (15-01 and 15-01A) has been performed since the 1980's and both stations have historically met statistical criteria for an Approved classification. Station 15-01A is approximately 1.8 miles downstream of the Wamchem site. Based upon the above information, the Shellfish Sanitation Section concluded that there should be no adverse health effects associated with the discharge. Therefore, the tributaries and marsh adjacent to McCalley Creek which are located in Area 14 and that were part of the administratively Prohibited area in McCalley Creek were upgraded to the current harvesting classification, Approved. This area is adjacent to that portion of

McCalley Creek between stations 15-01 and 15-01A (also see Shellfish Management Area 15 Annual Update).

C. **Marinas** - S.C. Regulation 61-47, Shellfish defines Marina as "any water area with a structure (docks, basin, floating docks, etc.) that is: 1) used for docking or otherwise mooring vessels; and, 2) constructed to provide temporary or permanent docking space for more than ten boats, or has more than 200 linear feet of docking space." There are currently no permitted marinas within Area 14.

D. **Radionuclides** - Sources of radionuclides have not been identified within Area 14, and radionuclide monitoring has not been conducted. No other source of poisonous or deleterious substances has been identified within the area.

NONPOINT SOURCE POLLUTION

A. **Stormwater** - Stormwater runoff impacts water quality by transporting fecal coliform bacteria (and other pollutants) from land to the shellfish growing area. Stormwater from roads, residences, and agricultural land is directed to the lowest point of elevation that is typically the nearest creek or marsh. In addition, there are freshwater wetland areas, ditches, and impoundments that drain into tidal creeks.

Beaufort County enacted a stormwater management utility in 2001. The stormwater utility assesses a stormwater fee to residential and non-residential property owners, and the fees collected are dedicated to stormwater-related activities. These may include operation and maintenance of stormwater systems, implementation of improvements to reduce stormwater-related problems such as flooding and stormwater runoff pollution, and related studies.

The Stormwater Master Plan (draft submitted in December 2004) and report were funded through the fees collected by the stormwater utility. The study was designed to identify problem areas related to stormwater, and to recommend a plan to solve problems and better control the impacts of stormwater on receiving waters in Beaufort County.

Most land disturbing activities in South Carolina must comply with the Stormwater Management and Sediment Reduction Act of 1991. The final regulations, effective on June 26, 1992, establish the procedures and minimum standards for a statewide stormwater management program. For activities in the eight coastal counties, additional water quality requirements are imposed. For all projects (regardless of size) that are located within one-half mile of a receiving water body in the coastal zone, the design criteria for permanent water quality ponds having a permanent pool requires that they be designed to store the first 2 inches of runoff from the entire site over a 24-hour period or the first one inch of runoff from the built-upon portion of the property, whichever is greater. Storage may be accomplished through retention, detention, or infiltration systems, as appropriate for the specific site. In addition, for those projects that are located within 1000 feet of shellfish beds, the first one and one half inches of runoff from the built-upon portion of the property must be retained on site. Since 1992, these regulations have been applied to the development of residential subdivisions, golf courses, and business areas.

B. Agricultural Waste - During the shoreline survey of Area 14, small herds of cattle were located adjacent to Bull River and Huspah Creek.

C. Individual Sewage Treatment and Disposal (ISTD) Systems - Currently, the majority of homes and businesses adjacent to Area 14 utilize ISTDs for wastewater disposal. New homes continue to be built at Bull Point Plantation, a 647-acre residential development adjacent to Huspah Creek. Wastewater is treated by individual aerobic treatment units (ATU). Coosaw Point is a 368-acre development adjacent to Coosaw River. Sewer will be provided to commercial buildings while most of the homes will utilize ISTDs. The developers have been granted 188 permits for ISTDs.

D. Wildlife and Domestic Animals - This area supports populations of white-tailed deer, raccoons, wading birds, migratory waterfowl, and other wildlife, which may contribute to fecal coliform levels in some areas. Domestic animals present in the area include dogs, cats, horses, and goats. A commercial monkey farm is located on Morgan Island. Monkeys are fed and roam free on the island until being captured and sold. Additionally, there are several impoundments in the upper reaches of Huspah Creek and along the Combahee, Chehaw, and Ashepoo Rivers that are utilized for waterfowl population management.

E. Boat Traffic - The Coosaw River provides access to St. Helena Sound and the Atlantic Ocean. The Atlantic Intracoastal Waterway (AIWW) is located in the Coosaw River between the Ashepoo-Coosaw Cutoff (near Combahee River) and Brickyard Creek. Tugs and barges, commercial and recreational vessels utilize this North/South route.

F. Hydrographic and Habitat Modification - Hydrographic and habitat modification in estuarine areas requires both State and Federal approval. Portions of the AIWW require maintenance dredging. The U.S. Army Corps of Engineers utilizes designated tracts of land adjacent to the AIWW as dredge spoil sites.

G. Marine Biotoxins - There have been no documented occurrences of toxic algae affecting shellfish growing area water quality in Area 14. The Department participates in a State Task Force on Toxic Algae and maintains a toxic algae emergency response team.

HYDROGRAPHIC AND METEOROLOGICAL CHARACTERISTICS

PHYSIOGRAPHY

Area 14 is part of the St. Helena Sound estuary which is a drowned river valley/bar built system containing numerous marsh islands and tidal creeks. It is among the largest of the South Atlantic estuaries. The average depth of the estuary is approximately 12 feet at mid-tide level. Extensive shallow areas and numerous tidal flats exist within the estuary. The AIWW (12 feet at MLW) is the only maintained navigational channel (NOAA, 1994).

Tides - Tides in Area 14 are semidiurnal, consisting of two low and high tides each lunar day. Mean tidal range is 5.9 feet during normal tides and 6.9 feet during spring tides. The

greatest tidal ranges of the year typically occur around full moon during the months of September through December. There is considerable variation in the normal tide range due to the prevailing strength and direction of winds.

Rainfall - Rainfall data used in this survey is collected at a weather station located at the City of Beaufort WWTP (Station 380559- Beaufort 7 SW). The rainfall gauge is typically read at about 7:00 AM and the rainfall amount is recorded for that date. As most shellfish samples are collected after 7:00 AM, the rainfall for the sample date + 24 hours has been added to the rainfall summary table. Rainfall for the sample date + 24 hours may correlate better and help to explain elevated fecal coliform concentrations in sample results, particularly if there was zero rainfall on the date of or prior to sampling.

Annual rainfall averages approximately fifty inches, with August being the wettest month. A chart showing yearly rainfall amounts for the years 1999 through 2005 is attached. Approximately 40% of the annual rainfall falls in the three-month period from June to August. Weather patterns during this time period are often characterized by thunderstorms and shower activity of a short duration. In addition, these three months also have the highest numbers of days with rainfall greater than one inch. The months of December through March historically have the greatest number of days with rainfall exceeding 0.10 inches and 0.50 inches. Rainfall events during these months are typically of a longer duration.

Annual rainfall recorded at the Beaufort 7SW weather station was significantly below the 30-year normal amount for 2000 and 2001 (see chart Beaufort Annual Rainfall) Below normal rainfall continued through May, 2002. By August 2002, the drought status of the 46 counties in the state, including Beaufort and Colleton, had been upgraded to extreme. Above normal rainfall, beginning in June led to the drought being declared over in Beaufort and Colleton counties in November 2002.

Winds - The prevailing wind direction from February to September ranges from South to South-Southwest (180 to 200 degrees). From October to January, prevailing wind is North-Northeast (20 degrees). The annual mean wind speed is 8.5 MPH, with August having the lowest (7.3 MPH) and March the highest (10.0 MPH) mean wind speed.

River discharges - The South Edisto River originates in the midlands of South Carolina and flows approximately 140 miles through the piedmont and coastal plain until it enters the Atlantic Ocean at Edisto Beach. It is the St. Helena Sound estuary's major freshwater source. The river discharges at an average rate of 2631 cubic feet per second. There is some exchange with Area 13 through the Intracoastal Waterway at Fenwick Cut, which connects the South Edisto and Ashepoo Rivers.

In Area 14, the Ashepoo River and Salkahatchie/Combahee Rivers are the main sources of the freshwater inflow. There appears to be significant impact, in the form of low salinities and high fecal coliform concentrations, to stations 19, 20, and 21, particularly in the winter and spring.

WATER QUALITY STUDIES

DESCRIPTION OF THE PROGRAM

The Department currently utilizes a systematic random sampling (SRS) strategy within Area 14 in lieu of sampling under adverse pollution conditions. In order to comply with NSSP guidelines, a minimum of thirty samples are required to be collected and analyzed from each station during the review period. Sampling dates are computer generated prior to the beginning of each quarterly period thereby insuring random selection with respect to tidal stage and weather. Day of week selection criteria is limited to Mondays, Tuesdays, and Wednesdays due to shipping requirements and laboratory manpower constraints. Sample schedules are rarely altered.

During July 1998, an updated data analysis procedure was formalized. Samples utilized for classification purposes are limited to those samples collected in accordance with the SRS for a 36-month period beginning January 1 and ending December 31. This allows for a maximum of 36 samples per station yet provides a six-sample "cushion" (above the NSSP required 30 minimum) for broken samples, lab error, breakdowns, etc. This also allows each annual report to meet the NSSP Triennial Review sampling criteria.

During the period January 1, 2003 through December 31, 2005, five hundred thirty-nine (539) routine surface water quality samples (<1.0 ft. deep) were collected for bacteriological analyses and classification purposes at 15 active water quality sampling stations in Area 14. The samples were collected in 120 ml amber glass bottles, immediately placed on ice and transported to the South Carolina Department of Health and Environmental Control's Trident District Environmental Quality Control laboratory at North Charleston, South Carolina or the Low Country District laboratory at Beaufort, South Carolina. An additional 120 ml water sample was included with each shipment as a temperature control. Upon receipt at the laboratory, sample sets that exceeded a 30-hour holding time or contained a temperature control > 10 degrees C. were discarded. Samples collected after September 1, 1986 have been analyzed using the five-tube/three dilution modified A-1 method described by Nuefeld (1985).

Surface water temperatures were measured utilizing hand-held, laboratory-quality calibrated centigrade thermometers. Salinity measurements were measured in the laboratory using automatic temperature compensated refractometers. Additional field data includes ambient air temperature, wind direction, tidal stage and date and time of sampling. Tidal stages were determined Nautical Software's *Tides and Currents*, Version 2 (1996).

MONITORING RESULTS

Stations 02, 04, 05, 08, 09, 10, 11, 12A, 13, and 16A, did not exceed a fecal coliform MPN geometric mean of 14 nor a fecal coliform MPN estimated 90th percentile value of 43, thus meeting the statistical criteria for Approved classification. Stations 14, 18, 19, 21 and 20 exceeded a fecal coliform MPN geometric mean value of 14 and/or a fecal coliform MPN estimated 90th percentile value of 43, thus exceeding the statistical criteria for an Approved classification.

CONCLUSIONS

Based on review of fecal coliform bacteriological data and the pollution source survey, Area 14 is impacted by three actual or potential sources of pollution.

NONPOINT SOURCE RUNOFF

The primary source of elevated fecal coliform bacteria concentrations in Area 14 appears to be nonpoint source in origin. The impact of rainfall on water quality is greater in headwaters areas such as Huspah Creek/Whale Branch than in the more open water areas of the Coosaw River. Possible sources of fecal coliform bacteria contamination include failing septic systems, pets, domestic animals such as horses and cows, wildlife, and drainage from roads and freshwater wetlands.

FRESHWATER INFLOW

Lower salinity and elevated fecal coliform bacteria concentrations associated with freshwater inflow from the Ashepoo and Combahee Rivers and Huspah Creek affects water quality at stations 02, 13, 14, 18, 19, 20, and 21 in Area 14. Lower salinities normally occur in the period between January and April. This was particularly evident during the El Niño event between November 1997 and April, 1998 when the area received abnormally high rainfall. Elevated bacteria concentrations also occur following rainfall events (>1.00 inches) and in samples collected at low tide.

Drainage from freshwater wetlands and waterfowl impoundments in these areas are probable sources of elevated fecal coliform bacteria concentrations. Abnormally high rainfall and river flow pushes river water with its' low salinity and corresponding high fecal coliform bacteria concentrations further downstream throughout Area 14.

INDIVIDUAL SEWAGE TREATMENT AND DISPOSAL SYSTEMS

Almost all homes adjacent to shellfish waters in Area 14 are served by ISTDs. Soils in most areas are considered to be suitable for ISTDs and systems should operate properly if maintained. However, many older homes with grandfathered systems may not meet current standards.

RECOMMENDATIONS

Station 20, adjacent to Fenwick Cut between the South Edisto and Ashepoo River, exceeds the statistical criteria for an Approved classification (estimated 90^{th} percentile value of 50 mpn). It is therefore recommended that the harvest classification of Fenwick Cut, as well as that portion of the Ashepoo River between Station 20 and Station 08 (mouth of Ashepoo River and St. Helena Sound), be re-classified as Restricted.

The shoreline survey and bacteriological data review of shellfish Management Area 14 indicate that changes in classification boundary descriptions are appropriate. The following growing waters classification of Area 14 will be as follows (see also Current Shellfish Growing Waters Map).

Prohibited: (Administrative closure)

1. Campbell Creek, from its headwaters to its confluence with Whale Branch Creek;
2. Halfmoon Creek, from its headwaters to its confluence with Whale Branch Creek.

Restricted:

1. Huspah Creek, from the Shellfish Management Area 14 boundary at S. C. Highway 17 to Station 14, Huspah Creek at Railroad Trestle;
2. Whale Branch Creek, from station 14, Huspah Creek at Railroad Trestle to Station 02, Campbell Creek at Whale Branch;
3. Ashepoo River, from Station 21, at the confluence of Mosquito Creek, to Station 08, at the mouth of the Ashepoo River and St. Helena Sound;
4. All waters of Fenwick Cut.

Approved:

The remaining waters of Area 14

Station Addition: None

Analysis of sampling data for Area 14 demonstrates the probability of a significant impact from rainfall exceeding 4.00" in a 24-hour period. Therefore, a precautionary closure of area 14 will be implemented following rainfall events of greater than 4.00" in a 24-hour period, as measured at the Beaufort-7-SW Weather Station. This methodology is associated with the concept of the Probable Maximum Precipitation (PMP). PMP estimates for the coastal United States have been published in a series of hydro-meteorological reports (HMRs) by the National Weather Service (*National Weather Service*). PMP estimates for South Carolina growing areas are derived from HMRs 51, 52, and 53 (*National Research Council, 1985*).

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TABLE #1
Shellfish Management Area 14
Water Quality Sampling Stations Description

Station	Description
02	Campbell Creek at Whale Branch
04	Bull River Inlet and Coosaw River
05	Combahee River Inlet and Coosaw River
08	Ashepoo River at St. Helena Sound - Black Can Buoy
09	St. Helena Sound at Morgan Back Creek
10	Parrot Creek and Coosaw River, Marker #1
11	Sam's Point and Coosaw River
12A	Confluence of Coosaw River and Whale Branch
13	Halfmoon Creek at Whale Branch
14	Huspah Creek at Railroad Trestle
16A	2000 Feet Southeast of Mouth of Fish Creek
18	Huspah Creek at Bull Point - Whale Branch POG
19	Ashepoo River POG
20	Cut Between the South Edisto River and the Ashepoo River
21	Confluence of Mosquito Creek and Ashepoo River

(Total 15)

Figure 1.

Shellfish Management Area 14
Prior Classification

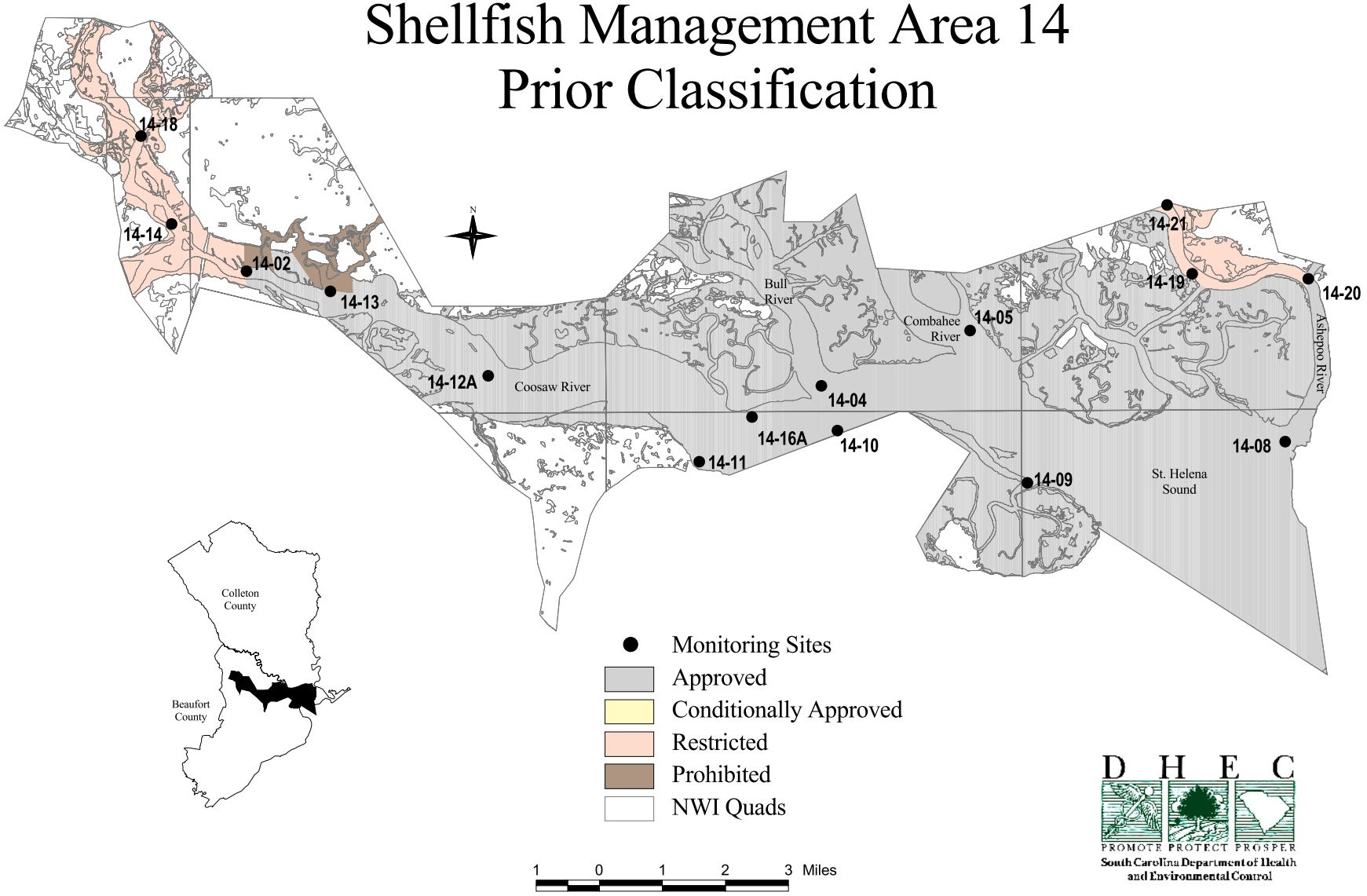

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Figure 2.

Shellfish Management Area 14
Current Classification

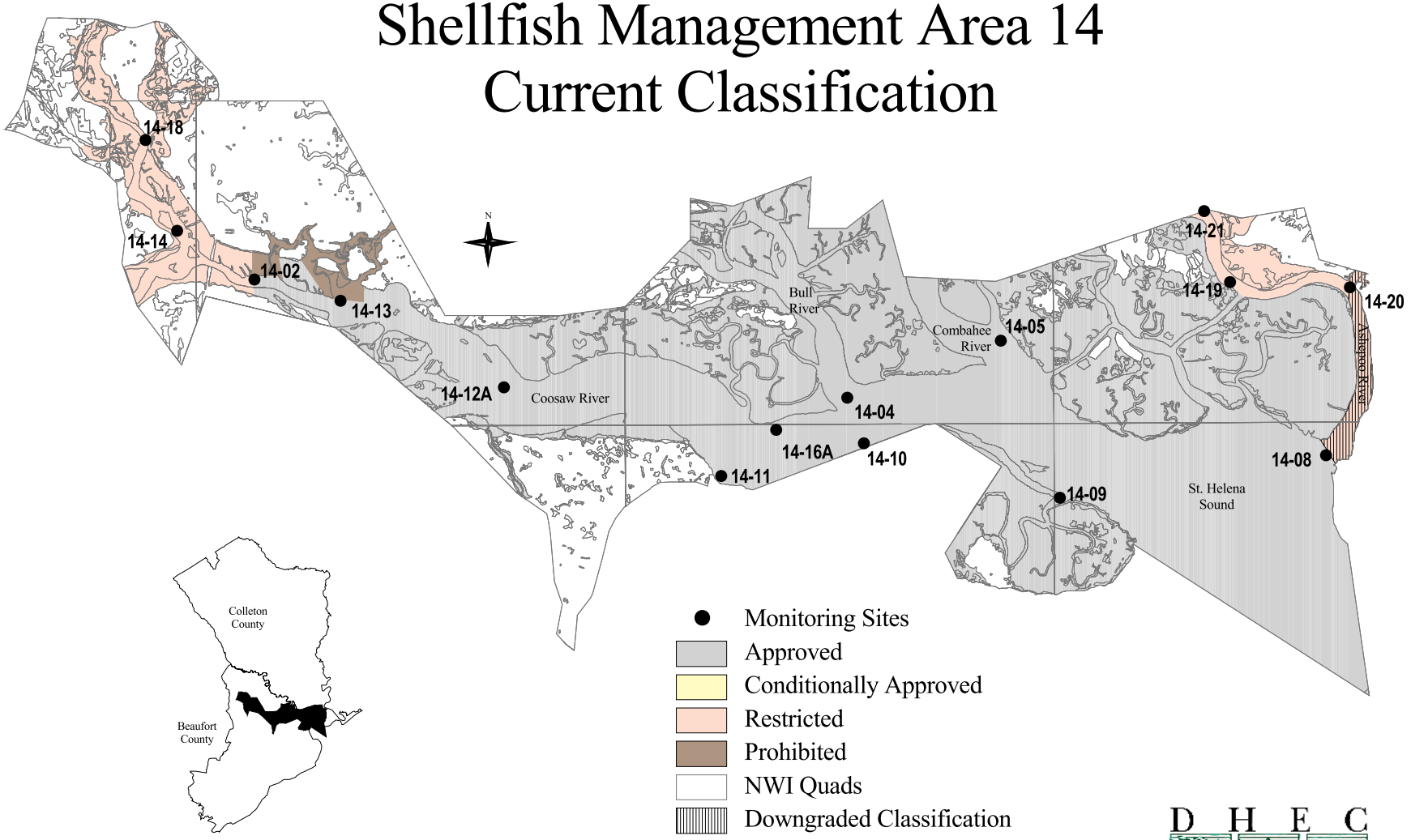

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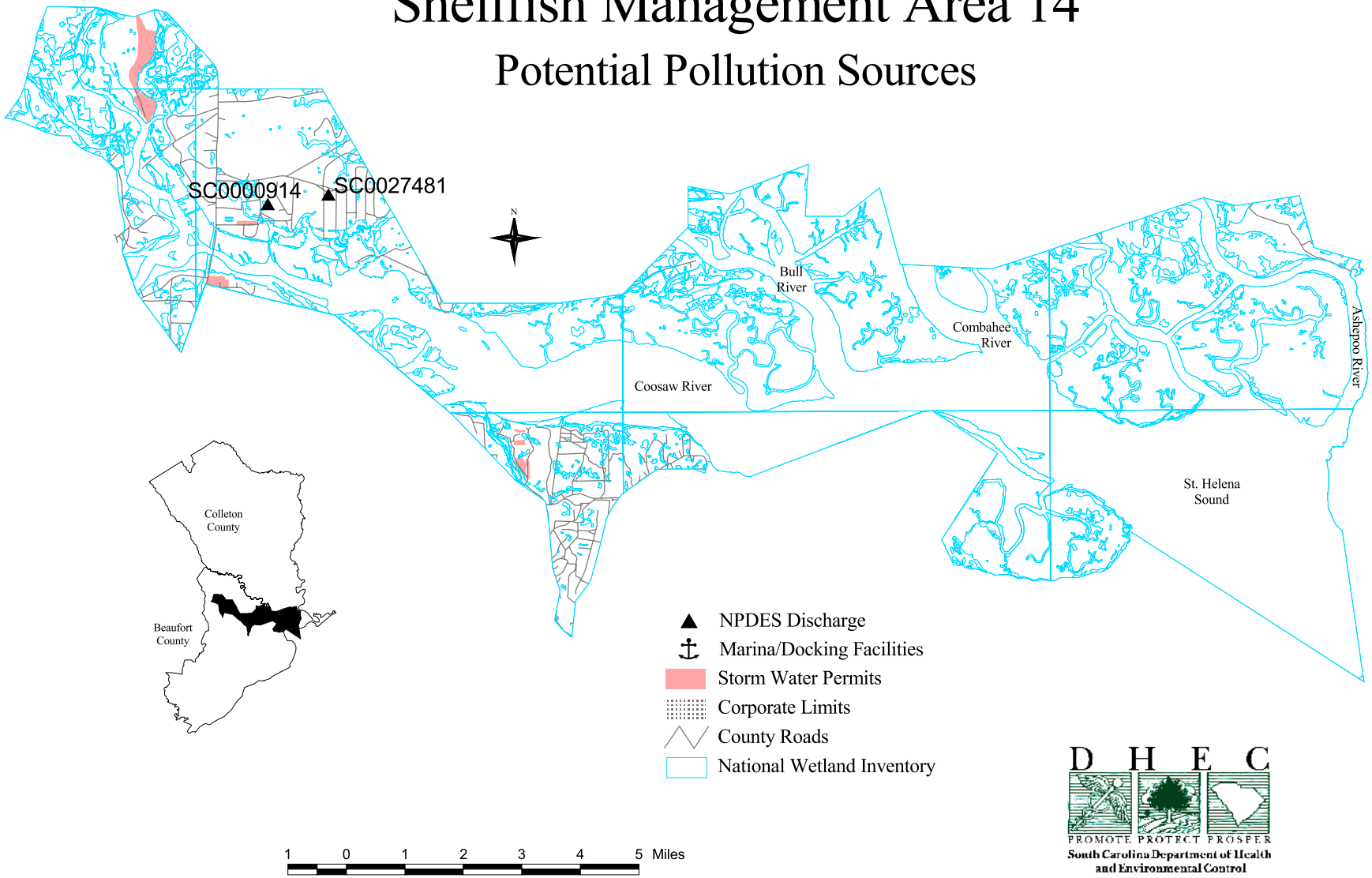
Figure 3.

Shellfish Management Area 14

Potential Pollution Sources



D H E C

PROMOTE PROTECT PROSPER

South Carolina Department of Health and Environmental Control

TABLE #2
Shellfish Management Area 14

FECAL COLIFORM BACTERIOLOGICAL DATA SUMMARY
from Shellfish Water Quality Sampling Stations between

January 1, 2003 and December 31, 2005

Station # →	2	4	5	8	9	10	11	12A	13	14	16A
Samples	36	36	36	36	36	36	36	36	36	36	36
GeoMean	8.1	3.2	4.2	4.0	4.0	3.2	3.7	4.4	9.1	16.3	3.1
90th %ile	28	7	11	11	14	9	10	12	39	66	7
Water Qlty	A	A	A	A	A	A	A	A	A	R	A
Classification	A	A	A	R	A	A	A	A	A	R	A

Station # →	18	19	20	21							
Samples	35	36	36	36							
GeoMean	26.0	18.0	9.8	20.1							
90th %ile	100	61	50	66							
Water Qlty	R	R	R	R							
Classification	R	R	R	R							

A - Approved **CA** - Conditionally Approved **R** - Restricted
RND - Restricted/No Depuration **P** - Prohibited

TABLE #3

WATER QUALITY
SAMPLING STATIONS DATA

Shellfish Management Area 14

Detailed data for each shellfish monitoring station listed in this report's "Fecal Coliform Bacteriological Data Summary Table" and in other shellfish reports, can be obtained by writing South Carolina's Department of Health and Environmental Control – Freedom of Information office at the address below.

Freedom of Information
SC Dept. of Health & Envir. Control
2600 Bull Street
Columbia, SC 29201

Any explanation or clarity needed on the report's content can be obtained by contacting the preparer(s), and/or reviewer(s) listed on the cover page.

TABLE #4

RAINFALL DATA

Shellfish Management Area 14

AREA 14 ANNUAL TABLE OF DAILY RAINFALL DATA

SOURCE: City of Beaufort Wastewater Treatment Plant

Beaufort, SC (Station #380559 / 7-SW)

2003	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1st	0.32	0.00	0.00	0.00	0.00	1.00	0.02	0.00	0.22	0.00	0.00	
2nd	0.00	0.00	0.47	0.00	0.00	0.00	0.61	0.14	0.00	0.00	0.00	0.00
3rd	0.00	0.00	**0.01**	0.00	0.10	**0.00**	0.84	0.00	0.00	0.00	0.00	**0.00**
4th	0.00	0.02	0.33	0.00	0.03	0.86	0.00	0.00	0.03	0.00	0.06	0.47
5th	0.00	0.03	0.08	0.00	0.00	0.51	0.03	0.56	0.02	0.00	**0.05**	0.44
6th	**0.00**	0.00	0.02	0.03	0.00	0.00	0.01	0.00	2.10	0.00	0.00	0.00
7th	0.00	0.42	1.04	0.09	0.43	0.16	0.00	0.30	0.15	0.01	0.00	0.00
8th	0.00	0.03	0.55	0.96	0.00	0.70	0.05	0.00	0.27	0.02	0.00	0.00
9th	0.00	0.00	0.02	**1.26**	0.00	0.36	0.00	0.00	0.15	0.07	0.00	0.00
10th	0.00	0.12	0.01	0.72	0.00	0.00	**0.00**	0.04	0.04	0.00	0.00	0.00
11th	0.00	0.31	0.00	0.15	0.00	0.00	0.00	0.02	0.00	0.02	0.00	
12th	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13th	0.00	0.00	0.00	0.00	0.00	0.00	0.39	**0.00**	0.00	0.00	0.00	0.00
14th	0.00	0.00	0.56	0.00	0.00	0.66	0.11	0.00	0.00	0.00	0.00	0.33
15th	0.00	0.00	0.21	0.00	0.00	0.00	0.21	0.00	0.00	0.00	0.00	0.08
16th	0.00	0.00	0.15	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17th	0.00	1.40	0.02	0.00	0.12	0.25	0.00	0.08	**0.00**	0.00	0.00	0.02
18th	0.00	**0.05**	0.38	0.00	1.92	0.26	0.00	0.36	0.00	0.07	0.00	0.00
19th	0.00	0.00	0.10	0.00		1.14		2.42	0.00	0.00	0.00	0.00
20th	0.00	0.00	0.11	0.00	0.00	0.00	3.95	0.00	0.00	**0.00**	0.36	0.00
21st	0.00	0.00	0.38	0.00	0.00	0.00	0.00	0.45	0.00	0.00	0.00	0.00
22th	0.03	0.02	0.00	0.07		0.00	0.00	0.00	0.00	0.00	0.00	0.00
23rd	0.23	0.58	0.00	0.00	3.01	0.00	0.00	0.00	0.25	0.00	0.00	0.00
24th	0.00	0.00	0.00	0.00	0.00	0.00	1.85	0.00	0.05	0.00	0.00	0.04
25th	0.00	0.00	0.00	0.00	0.04	0.00	1.29	0.16	0.00	0.00	0.00	0.00
26th	0.00	0.00	0.00	1.34	0.16	0.00	0.62	0.51	0.00	0.00	0.00	0.00
27th	0.00	0.45	0.00	0.46	0.11	0.00	0.20	0.03	0.00	0.00	0.00	0.00
28th	0.00	0.09	0.01	0.00	0.00	0.00	0.63	0.00	0.00	0.25	0.00	0.00
29th	0.00		0.00	0.00	0.00	1.00	0.36	0.00	0.00	2.60	0.21	0.00
30th	0.00		0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.00
31st	0.00		0.30		0.00		0.00	0.00		0.00		0.00
(Monthly Figures)							**Year's Rainfall Total:**				**51.80**	
SUM	0.58	3.52	4.75	5.08	6.20	7.05	11.17	5.07	3.28	3.04	0.68	1.38
MAX	0.32	1.40	1.04	1.34	3.01	1.14	3.95	2.42	2.10	2.60	0.36	0.47
MIN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AVG	0.02	0.13	0.15	0.17	0.21	0.24	0.37	0.16	0.11	0.10	0.02	0.05

"ND"/"--" = no data (Shaded/bold cells indicate the dates shellfish waters were sampled.)

AREA 14 ANNUAL TABLE OF DAILY RAINFALL DATA

SOURCE: City of Beaufort Wastewater Treatment Plant

Beaufort, SC (Station #380559 / 7-SW)

2004	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1st	0.00	0.00	0.00	0.00	0.02	0.09	0.13	1.23	0.60	0.00	0.00	0.00
2nd	0.00	0.00	0.00	0.00	1.36	**0.02**	0.05	0.12	0.25	0.00	**0.00**	0.00
3rd	0.00	0.28	0.00	0.00	1.26	0.00	0.01	0.40	0.40	0.00	0.00	0.00
4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00
5th	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.10	0.00	0.10	0.00
6th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.59	0.00	0.00	**0.03**
7th	0.00	0.43	0.00	0.00	0.00	0.09	**0.00**	0.00	1.20	0.00	0.00	0.00
8th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00
9th	0.10	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.52	0.00	0.00
10th	0.36	0.00	**0.12**	0.00	0.00	0.03	0.36	0.00	0.00	0.00	0.00	0.02
11th	0.00	0.00	0.00	0.00	0.00	1.74	0.10	**0.00**	0.26	0.00	0.20	0.06
12th	0.00	0.61	0.00	1.16	0.10	0.00	1.28	0.00	0.40	0.00		0.00
13th	0.00	0.35	0.00	0.28	0.00	0.00	0.00	1.90		0.00	0.20	0.00
14th	0.00	0.47	0.00	0.11	0.00	0.78	0.00	0.39		0.00	0.00	0.00
15th	0.00	0.56	0.00	0.00		0.86	0.00	0.76	0.50	0.39	0.00	0.00
16th	0.00	0.05	0.20	0.00	0.44	0.82	0.00	0.03	0.50	0.35	0.00	0.00
17th	0.00	0.10	0.00	0.00	0.03	0.06	0.00	0.00	0.03	0.00	0.00	0.00
18th	0.04	**0.01**	0.00	0.00	0.00	0.00	0.43	0.15	0.00	0.00	0.00	0.00
19th	0.03	0.00	0.00	**0.00**	**0.00**	0.00	0.86	0.00	0.00	**0.00**	0.00	0.00
20th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.48	0.00	0.00
21st	0.00	0.00	0.00	0.00	0.00	0.16	1.10	0.00	**0.00**	0.00	0.06	0.00
22th	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.08	0.00
23rd	0.00	0.00	0.00	0.00	0.00	0.45	0.00	0.33	0.00	0.00	0.00	0.07
24th	0.00	0.70	0.00	0.00	0.00	0.21	0.00	1.25	0.00	0.00	0.00	0.00
25th	0.02	0.02	0.00	0.00	0.00	0.00	0.52	0.00	0.00	0.00	0.29	0.00
26th	**0.01**	0.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.52
27th	1.32	0.06	0.00	0.31	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.26
28th	0.02	0.00	0.00	0.00	0.00	0.18	0.00	0.21	0.07	0.00	0.50	0.00
29th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.51	0.00	0.00
30th	0.00		0.00	0.00	0.19	0.00	0.16	0.00	0.00	0.00	0.00	0.00
31st	0.00		0.06		0.00		0.00	0.50		0.00		0.00
(Monthly Figures)							**Year's Rainfall Total:**				**43.15**	
SUM	1.90	4.52	0.38	1.91	3.40	5.76	5.00	7.61	7.01	2.25	1.45	1.96
MAX	1.32	0.88	0.20	1.16	1.36	1.74	1.28	1.90	2.00	0.52	0.50	1.52
MIN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AVG	0.06	0.16	0.01	0.06	0.11	0.19	0.16	0.25	0.25	0.07	0.05	0.06

"ND"/"--" = no data (Shaded/bold cells indicate the dates shellfish waters were sampled.)

AREA 14 ANNUAL TABLE OF DAILY RAINFALL DATA

SOURCE: City of Beaufort Wastewater Treatment Plant

Beaufort, SC (Station #380559 / 7-SW)

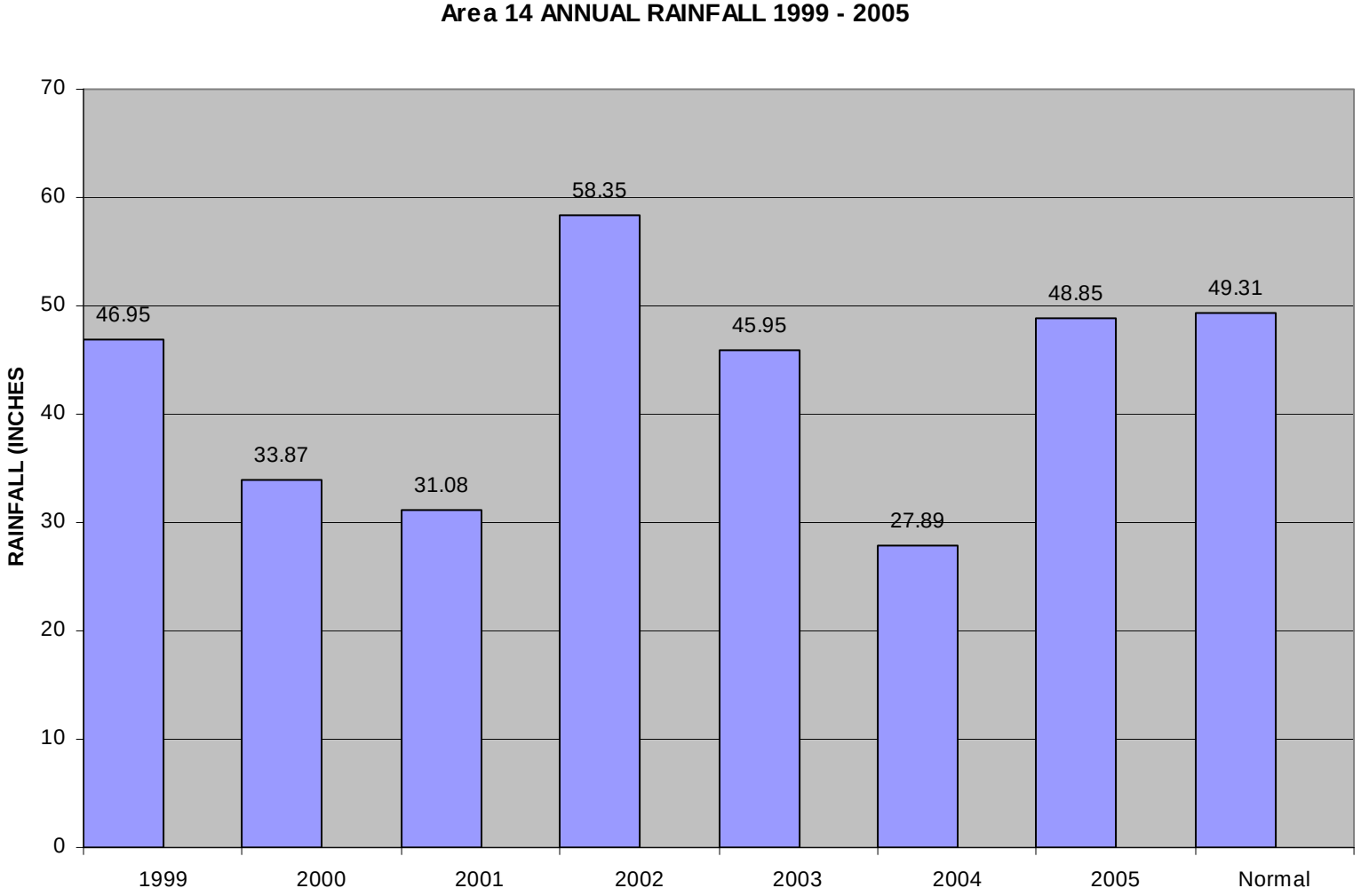
2005	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1st	0.00	0.00	0.00	0.00	0.20	1.34	0.00	1.10	0.12	0.00	0.00	0.00
2nd	0.00	0.00	**0.00**	0.86	0.00	0.03	0.40	0.00	0.00	0.00	**0.00**	0.00
3rd	0.00	0.20	0.00	0.00	0.00	2.03	0.00	0.00	0.00	0.00	0.00	0.00
4th	0.00	0.50	0.00	**0.00**	0.00	0.67	0.11	0.00	0.00	0.30	0.00	0.06
5th	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.30	0.00	0.00
6th	0.00	0.00	0.00	0.00	1.72	0.16	0.70	0.00	0.00	2.20	0.00	1.10
7th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.14	0.00	**0.00**
8th	0.00	0.00	0.32	0.92	0.00	0.00	0.00	0.70	0.00	0.66	0.00	0.11
9th	0.02	0.00	0.09	0.00	0.00	0.30	1.15	0.33	0.00	0.00	0.00	0.77
10th	0.00	0.20	0.00	0.00	0.00	0.00	0.40	0.40	0.00	**0.63**	0.00	0.00
11th	0.00	0.00	0.00	0.00	0.32	0.20	0.00	0.10	0.00	0.00	0.00	0.00
12th	**0.00**	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.00	0.02	0.00	0.00
13th	0.00	0.00	0.00	0.14	0.00	0.00	0.00	0.02	0.00	0.03	0.00	0.00
14th	0.70	0.00	0.00	0.02	0.00	0.00	0.97	0.00	0.00	0.00	0.00	0.00
15th	0.80	0.70	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.04	0.02
16th	0.00	0.00	0.84	0.00	0.00	0.31	0.00	0.00	0.00	0.00	0.00	0.15
17th	0.00	**0.00**	0.62	0.00	0.68	0.00	0.00	0.00	0.00	0.00	0.00	0.02
18th	0.00	0.00	0.05	0.00	**1.46**	0.00	0.00	0.68	0.00	0.00	0.00	1.31
19th	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.03
20th	0.00	0.00	0.00	0.00	0.00	**2.03**	0.00	0.00	0.00	0.00	0.00	0.00
21st	0.00	0.00	0.00	0.00	1.14	0.00	**0.00**	0.00	0.00	0.00	3.40	0.00
22th	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.57	0.14	0.00
23rd	0.00	0.00	2.11	0.25	0.00	0.00	0.00	**0.33**	0.00	0.00	0.00	0.00
24th	0.00	0.35	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.46	0.00	0.00
25th	0.70	0.00	0.02	0.00	0.00	0.17	0.00	0.75	0.00	0.00	0.00	0.09
26th	0.00	0.07	0.18	0.00	0.00	0.31	0.00	0.00	0.09	0.00	0.00	0.01
27th	0.00	0.07	3.12	0.80	0.00	0.04	0.00	1.25	0.00	0.00	0.11	0.00
28th	0.00	1.47	2.72	0.00	0.00	0.05	0.00	0.00	**0.00**	0.00	0.70	0.00
29th	0.20		0.04	0.00	0.00	1.86	0.00	0.00	0.00	0.00	0.00	0.20
30th	0.55		0.00	0.00	0.52	0.08	0.00	0.00	0.00	0.00	0.00	0.00
31st	0.00		0.00		0.00		0.06	0.23		0.00		0.00
(Monthly Figures)							**Year's Rainfall Total:**				**59.83**	
SUM	2.97	3.81	10.11	2.99	6.29	9.73	3.81	6.34	0.21	5.31	4.39	3.87
MAX	0.80	1.47	3.12	0.92	1.72	2.03	1.15	1.25	0.12	2.20	3.40	1.31
MIN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AVG	0.10	0.14	0.33	0.10	0.20	0.32	0.12	0.20	0.01	0.17	0.15	0.12

"ND"/"--" = no data (Shaded/bold cells indicate the dates shellfish waters were sampled.)

Shellfish Management Area 14
SUMMARY OF RAINFALL DURING
AND PRIOR TO FECAL COLIFORM SAMPLING

Sample Date	Sample Date + 24 hours	Sample Date	Sample Date - 24 hours	Sample Date - 48 hours	Sample Date - 72 hours
01/06/03	0.00”	0.00”	0.00”	0.00”	0.00”
02/18/03	0.00”	0.05”	1.40”	0.00”	0.00”
03/03/03	0.33”	0.01”	0.47”	0.00”	0.09”
04/09/03	0.72”	1.26”	0.96”	0.09”	0.03”
05/22/03	3.01”	0.00”	0.00”	0.00”	2.80”
06/03/03	0.86”	0.00”	0.00”	1.00”	0.00”
07/10/03	0.00”	0.00”	0.00”	0.05”	0.00”
08/13/03	0.00”	0.00”	0.00”	0.02”	0.04”
09/17/03	0.00”	0.00”	0.00”	0.00”	0.00”
10/20/03	0.00”	0.00”	0.00”	0.07”	0.00”
11/05/03	0.00”	0.05”	0.06”	0.00”	0.00”
12/03/03	0.47”	0.00”	0.00”	0.00”	0.00”
01/26/04	1.32”	0.01”	0.02”	0.00”	0.00”
02/18/04	0.00”	0.01”	0.10”	0.05”	0.56”
03/10/04	0.00”	0.12”	0.00”	0.00”	0.00”
04/19/04	0.00”	0.00”	0.00”	0.00”	0.00”
05/19/04	0.00”	0.00”	0.00”	0.03”	No data
06/02/04	0.00”	0.02”	0.09”	No data	No data
07/07/04	0.00”	0.00”	0.00”	0.00”	0.00”
08/11/04	0.00”	0.00”	0.00”	0.00”	0.00”
09/21/04	0.00”	0.00”	0.00”	0.00”	0.00”
10/19/04	0.48”	0.00”	0.00”	0.00”	0.35”
11/02/04	0.00”	0.00”	0.00”	0.00”	0.00”
12/06/04	0.00”	0.03”	No data	0.00”	0.00”
01/12/05	0.00”	0.00”	0.00”	0.00”	0.02”
02/17/05	0.00”	0.00”	0.00”	0.70”	0.00”
03/02/05	0.00”	0.00”	0.00”	1.47”	0.07”
04/04/05	0.00”	0.00”	0.00”	0.86”	0.00”
05/18/05	0.00”	1.46”	0.68”	0.00”	0.00”
06/20/05	0.00”	2.03”	0.15”	0.00”	0.31”
07/20/05	0.00”	0.00”	0.00”	0.00”	0.00”
08/23/05	0.75”	0.33”	0.00”	0.00”	0.00”
09/28/05	0.00”	0.00”	0.00”	0.09”	0.00”
10/11/05	No data	No data	No data	No data	No data
11/02/05	0.00”	0.00”	0.00”	0.00”	0.00”
12/07/05	0.11”	No data	1.10”	No data	0.06”

Amounts Shown Are per Day, not Cumulative / Station 380559 - Beaufort 7 – SW


Area 14 ANNUAL RAINFALL 1999 - 2005
RAINFALL (INCHES
70
60
50
40
30
20
10
0
46.95
33.87
31.08
58.35
45.95
27.89
48.85
49.31
1999
2000
2001
2002
2003
2004
2005
Normal